

COMPAQ

technical reference manual
Evo D510 e-pc

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WARNING: Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.



CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

technical reference manual

Evo D510 e-PC

First Edition August 2002

Document Part Number: 305511-001

Information Roadmap

Use the  icon in Acrobat Reader to search for information in this PDF.

The following types of information are available for your computer:

Technical Reference

See the *Technical Reference Manual* (this document).



The *Technical Reference Manual*, available in PDF format on the support Web site <http://www.compaq.com/support>, provides information on:

- Your computer's hardware components
- The drivers, software and BIOS used in your computer.

Troubleshooting

See the *Troubleshooting Guide*.



The *Troubleshooting Guide* will help you solve problems with your computer. It is available in PDF format on the support Web site <http://www.compaq.com/support>. The *Troubleshooting Guide* will help you:

- Find out what to do first if you encounter a problem with your computer
- Identify the problem area and provide a possible solution
- Find further service and support if you still can't solve the problem
- Collect relevant information on your computer before contacting support.

Installing, Configuring, Upgrading

See the *Illustrated Parts Map* or the *Upgrade Guide*.



The *Illustrated Parts Map* available in PDF format on the support Web site <http://www.compaq.com/support>, provides information on:

- Computer configurations
- Replacement parts

The *Upgrade Guide* will help you upgrade and replace components in your computer, including the hard drive, memory, battery, power supply, and optical disk drives. More information is available on the support Web site <http://www.compaq.com/support>.

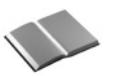
Discover and Use Your Product

See the *Quick Start* card and other documentation provided with your computer.



The *Quick Start* card provided with your computer will help you:

- Set up and begin using your computer for the first time
- Upgrade and replace components in your computer, including the hard drive and memory. More information is available on the support Web site <http://www.compaq.com/support>.
- Find out where to get more information



The other documentation provided with your computer includes basic troubleshooting information, technical specifications, warranty and legal information.

Information on the hp Support Web Site

Connect to the support Web site <http://www.compaq.com/support> and search for *Evo D510 e-pc*. This site provides a wide range of information, including:

- Downloadable documentation
- Service and support options
- The latest BIOS, drivers and utilities
- Answers to Frequently Asked Questions

System Restore CD-ROMS

Used for restoring the computer's preloaded hard disk contents. Includes instructions on how to restore your preloaded software including operating system, drivers and utilities.

Finding Information

Use the following table to determine where to locate particular types of information.

Type of Information	Location
<ul style="list-style-type: none"> • Support phone numbers • Technical support contact information • Warranty information 	The documentation provided with your computer
How to set up your computer	<i>Quick Start Card</i>
Operation of your computer	Operating system and application manuals
<ul style="list-style-type: none"> • Diagrams and detailed instructions on installing add-on devices • Internal wire connections for adding hard drives, CD-ROM, etc. • Memory expansion and replacing devices 	<i>Upgrade Guide</i>
<ul style="list-style-type: none"> • LAN configuration • LAN controller 	<i>Technical Reference Manual</i>
<ul style="list-style-type: none"> • Identifying the problem • Information on errors • Problem solving • Troubleshooting 	<i>Troubleshooting Guide</i>
Parts list	<i>Illustrated Parts Map</i>
<ul style="list-style-type: none"> • BIOS • Connectors • Specifications • System board layout • Technical diagrams 	<i>Technical Reference Manual</i>

Bibliography

Datasheets and other information can be obtained at:

- Intel Chipsets
developer.intel.com
- Intel Dynamic Video Memory Technology
developer.intel.com/business/products/chipsets/dvmt_white.pdf
- Intel Celeron & Pentium 4 Processors
<http://www.intel.com/design/celeron>
<http://www.intel.com/design/pentium4>
- Analog Devices AD1981A
<http://www.analogdevices.com>
- Intel LAN card
<http://www.intel.com/support/network>
- ATI graphics cards
<http://www.ati.com>
- Hewlett-Packard white papers are available on a variety of subjects including AGP graphics and SDRAM memory at:
<http://www.hp.com/go/library>

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System Overview

This chapter introduces the internal and external features, and lists the specifications of the Compaq Evo D510 e-pc.

System Features

Component	Description
Package Description	1 external shelf for a Slim CD drive. 1 internal bay for a 3 1/2 inch hard drive. Width: 25.0 cm (9.80 in.) Height: 9.7 cm (3.82 in.) Depth: 31.0 cm (12.2 in.)
Processor	Intel Pentium 4: 2.0 GHz to 2.6 GHz (400 MHz FSB) Intel Celeron 1.7 GHz to 1.8 GHz (400 MHz FSB)
Operating System	<ul style="list-style-type: none"> Preloaded Windows XP Professional RTM, with possibility of downgrade to Windows 2000 SP2 with recovery CD Preloaded Windows XP Home RTM Preloaded Windows 2000 SP2 Linux offer available (no preload, only a CD in the box)
System Board:	
Chipset	Intel 845G with integrated video
I/O capability	2 memory slots, 1 IDE connector for hard drive, 1 IDE connector for CD-ROM (specific connector format)
Graphics	Intel 845G integrated graphics with 8MB graphics memory
Audio	Integrated ADI audio CODEC, AC97 compliant
LAN	Integrated Intel Pro/100 VE Network Adapter (10 Base-T/100 Base-TX LAN Interface)
Mass storage	<p>Slim CD-ROM drive: 24X IDE Slim CD-RW drive: 8X, 8X, 24X IDE Slim DVD-ROM drive: 8X, 24X IDE</p> <p>Choice of hard drives: Ultra ATA/100: 20 GB (5400 rpm), 20 GB (7200 rpm), 40 GB (5400 rpm), 40 GB (7200 rpm), 80 GB (7200 rpm)</p> <p>Theoretical maximum hard drive capacity of 144 PB (1015) using 48 bit BA addressing mode</p>
Main memory	Two DIMM sockets using: 128 MB, 256 MB, 512 MB and 1 GB 266 MHz DDR-SDRAM (non-ECC). Maximum of 2 GB.

System Features (Continued)

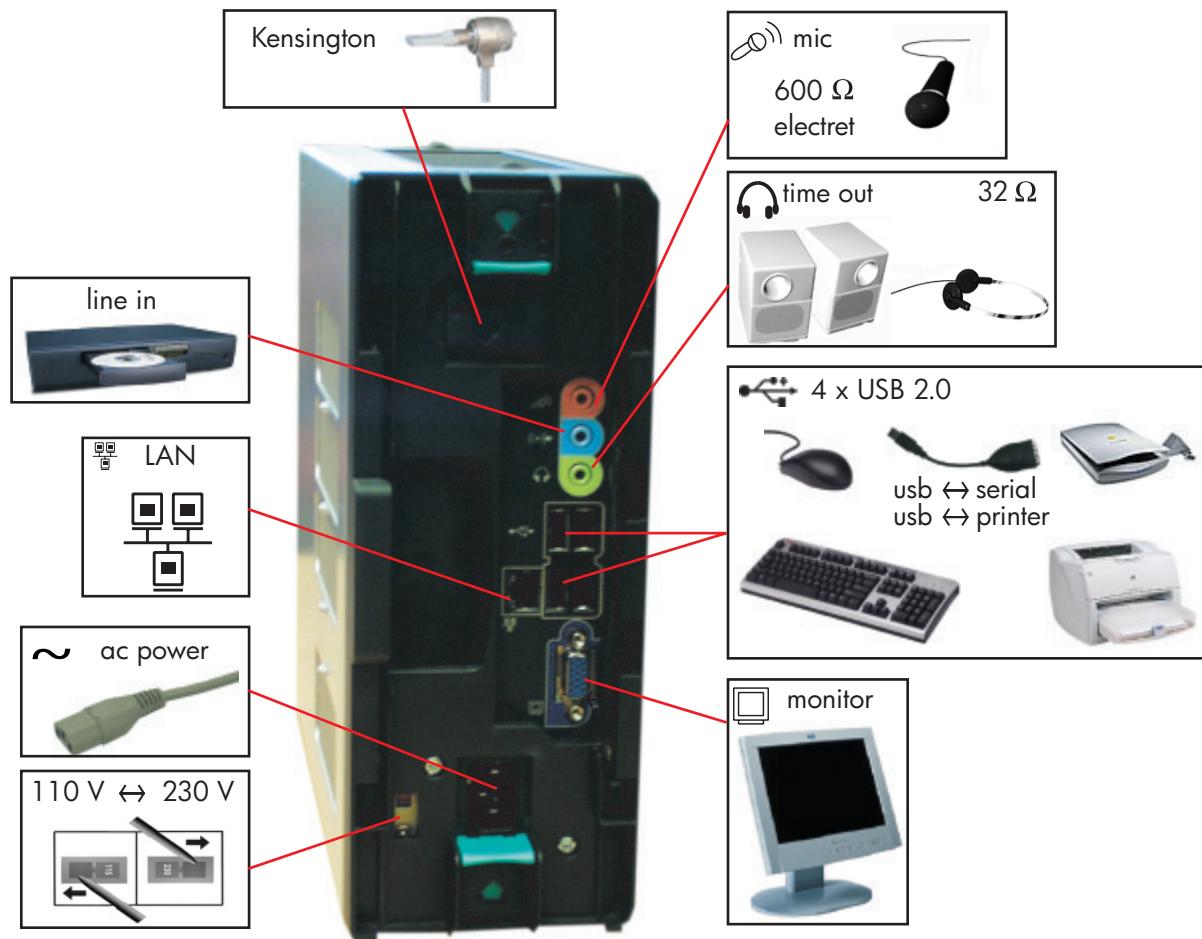
Component	Description
Input devices	Compaq USB easy access keyboard Compaq USB scrolling mouse ComStation Pro (Wireless keyboard and mouse)
Power supply	Input voltage: 100–127 V~ 6 A max, 200–240 V~ 4 A max Input frequency: 50 Hz/60 Hz
Connectors	6 USB 2.0 connectors (2 front, 4 rear), VGA connector, LAN, audio (microphone, line in, amplifier out) USB to serial and USB to printer adapters available as options
BIOS	HP/American Megatrends, Inc. (AMI) BIOS, Version: JK.xx.yy (for example JK.01.01)

Package Features

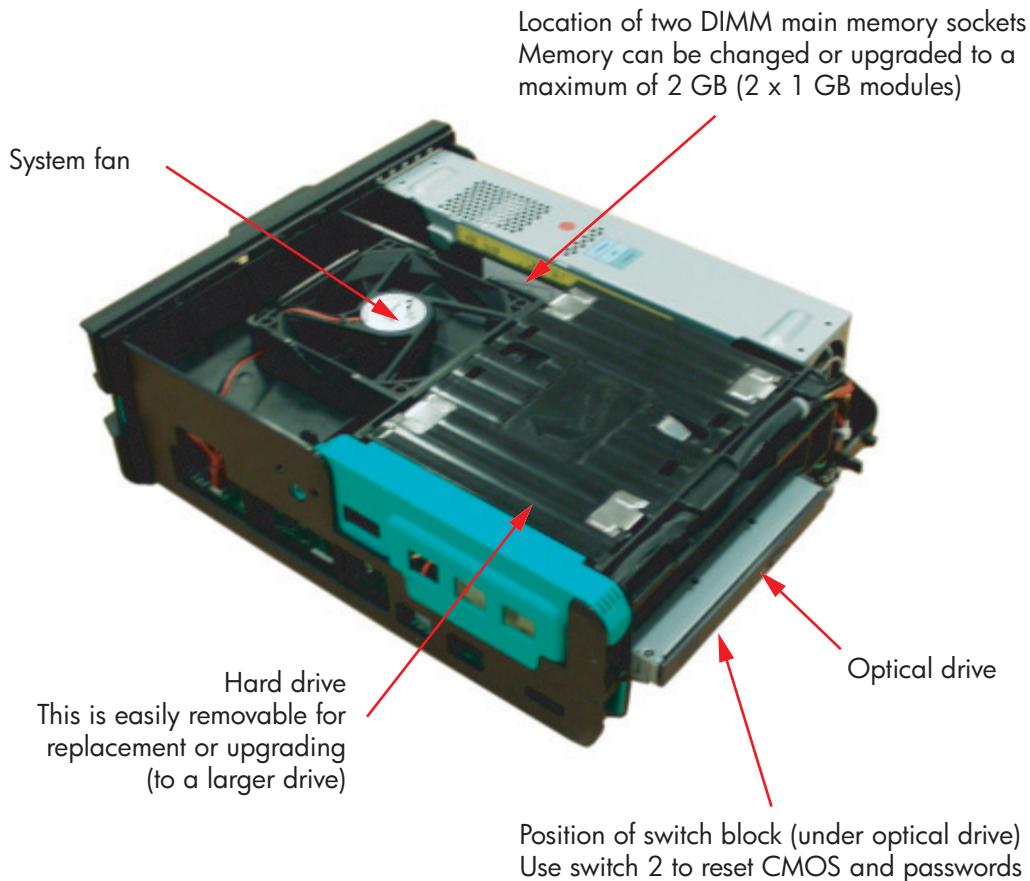
Front View



Rear View



View with Cover Removed



Specifications

Physical Characteristics

Characteristic	Description
Weight (configuration with 1 CD-ROM drive, excluding keyboard and display)	4.5 kg (9.92 pounds)
Dimensions	Width: 25.0 cm (9.80 in.) Height: 9.7 cm (3.82 in.) Depth: 31.0 cm (12.2 in.)
Footprint	Vertical Position: 0.0301 m ² (0.324 ft ²) Horizontal Position: 0.0775 m ² (0.835 ft ²)
Power Supply	
Input voltage (voltage selection switch)	100–127 V~ 6 A max, 200–240 V~ 4 A max
Input frequency	50 Hz/60 Hz

Power Consumption

The standard base models of this product meet the Energy Star guidelines for energy efficiency.

Power Consumption—Windows 2000 115 V/60 Hz and 230 V/50 Hz	
Maximum operating	70 W
Typical operating	50 W
Sleep (suspend)	<2.5 W
Off	<2.5 W

Acoustic Noise Emission

The following values are given for the standard configuration as shipped and can vary depending on the actual components used.

Acoustic Noise Emission (ISO 7779)	Sound Power (Average)	Sound Pressure at Operator Position
Idle (typical)	$L_{WA} \leq 3.2 \text{ B(A)}$	$L_{pA} \leq 26 \text{ dB(A)}$
Operating with hard disk access	$L_{WA} \leq 3.4 \text{ B(A)}$	$L_{pA} \leq 28 \text{ dB(A)}$

Environmental Specifications

Operating temperature and humidity ranges may vary depending upon the mass storage devices installed. High humidity levels can cause improper operation of disk drives. Low humidity levels can aggravate static electricity problems and cause excessive wear of the disk surface.

Environmental Specifications (System Processing Unit, with Hard Disk)

Operating Temperature	10° C to 35° C (50° F to 95° F)
Storage Temperature	-40° C to 70° C (-40° F to 158° F)
Operating Humidity	15% to 80% (relative)
Storage Humidity	8% to 85% (relative), non-condensing at 40° C (104° F)

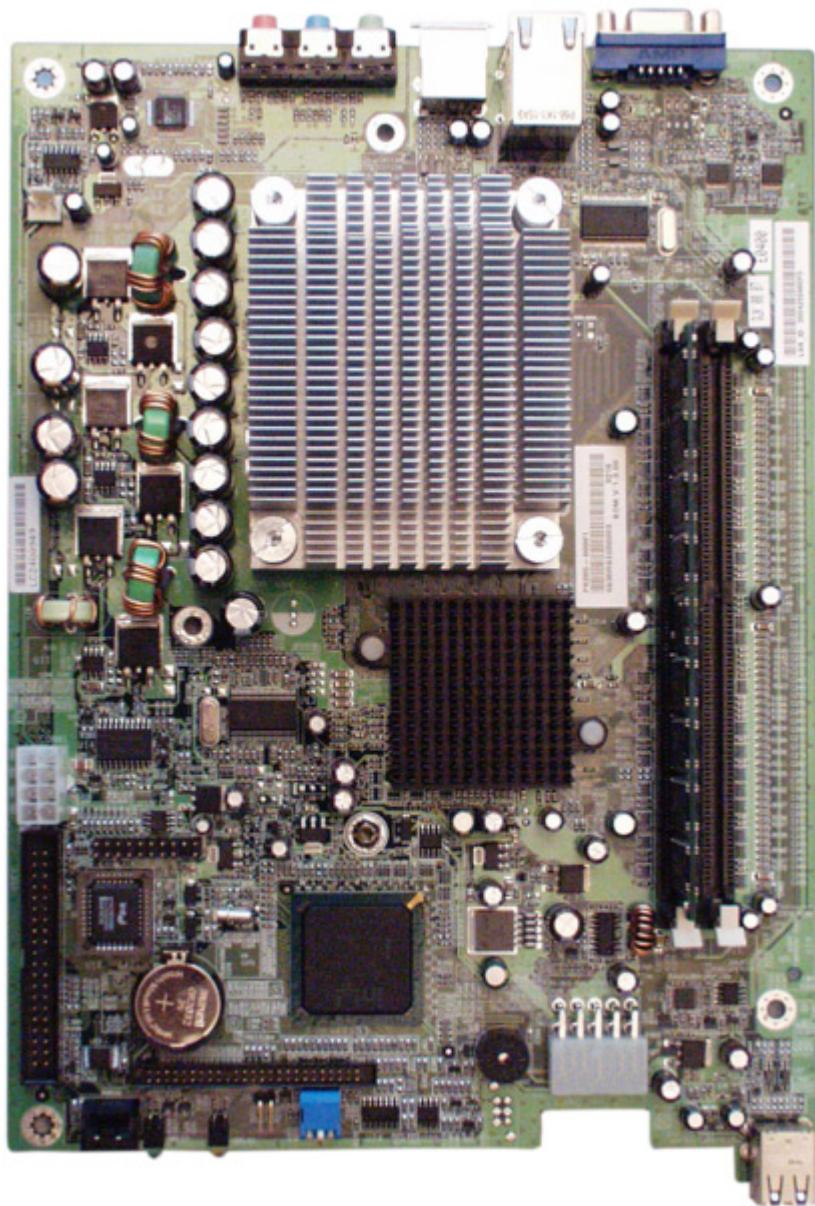
System Features

This chapter describes core components of the Compaq Evo D510 e-pc such as the chipset, processor, mass storage devices, graphics controllers, audio controllers, network features and input devices.

System Board Layout

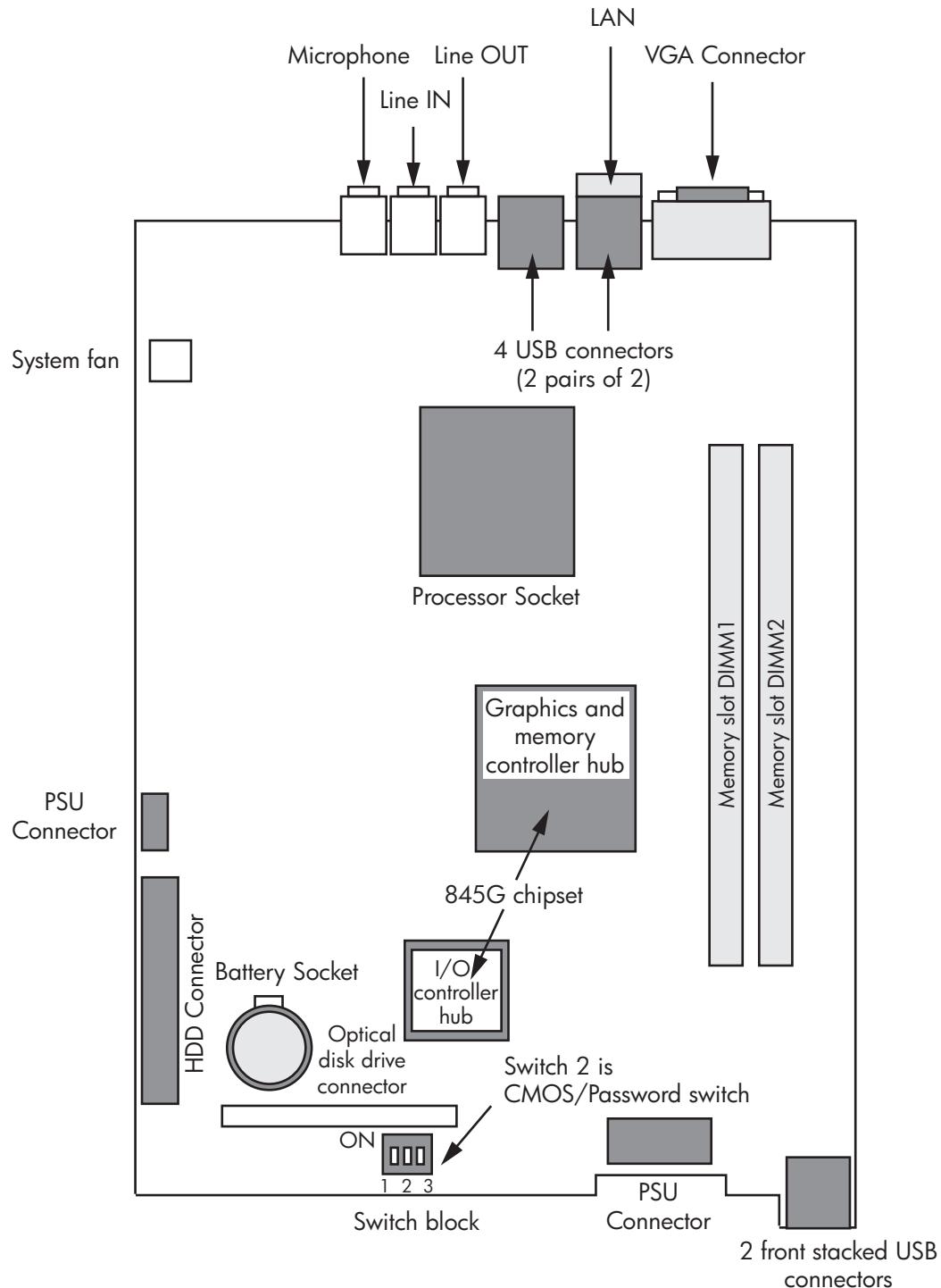
The system board uses either a Celeron or a Pentium 4 processor and two DIMM main memory slots.

System Board



System Board Components

The following diagram shows where the different slots and connectors are located on the system board.



WARNING: There is a risk of explosion if the battery is not replaced by the correct type. Make sure you dispose of used batteries according to instructions provided.

Chipset

The Compaq Evo D510 e-pc features the Intel 845G chipset.

The 845G chipset offers the available bandwidth of DDR-SDRAM 266 MHz main memory, coupled with a 400 MHz Front Side Bus (FSB) and high speed USB 2.0 connectivity for high PC performance.

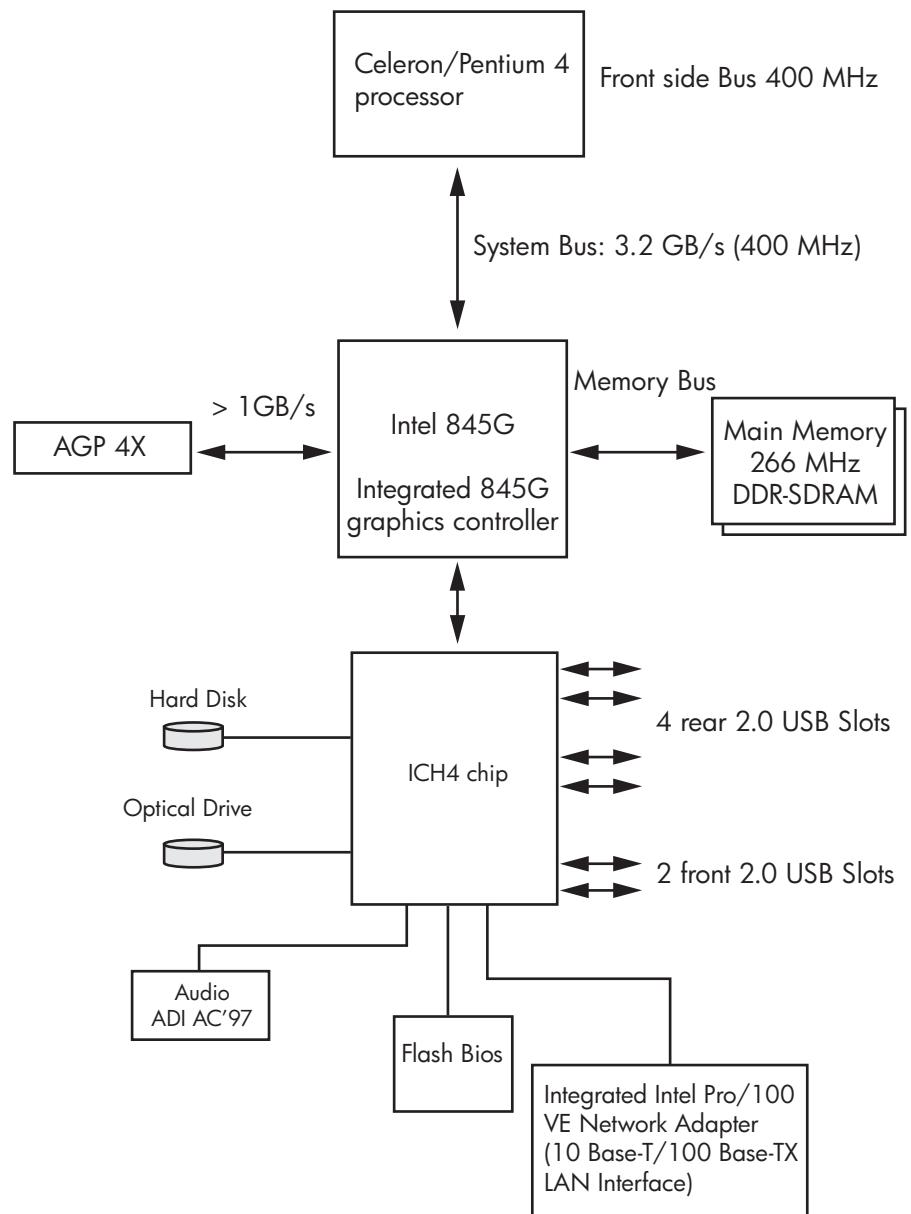
The 845G chipset consists of two controller hubs:

- The 82845G Graphics Memory Controller Hub (GMCH) supports 400 MHz system bus design, PC133 or DDR200/DDR266 SDRAM memory, and the new integrated graphics architecture. It features Intel's Dynamic Video Memory Technology (DVMT) and Zone Rendering Technology (ZRT).
- The 82801DB I/O Controller Hub (ICH4) brings high speed USB 2.0, offering up to 40 times the bandwidth of USB 1.1 for I/O intensive applications.

Main Features

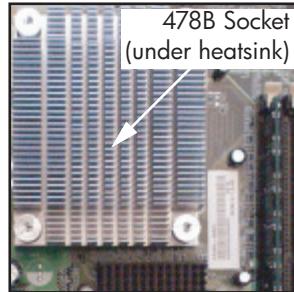
- Support for Intel Pentium 4 and Celeron processor
- PGA478 socket
- 32 bpp true color support for high resolution texture
- Memory bandwidth DDR200/266 SDRAM support
- 2.0 GB Max memory
- 2 DIMM, no ECC
- ICH4 I/O Connectivity
- Six high speed USB 2.0 ports offering up to 40 times the bandwidth of original USB 1.1
- Enhanced audio
- 400 MHz system bus compatibility
- AGP 4X interface providing the most advanced graphics support available
- LAN connect Interface (LCI) provides flexible network solutions
- Dual Ultra ATA/100 controllers
- Communication and Networking Riser (CNR) card capability
- Low power sleep mode.

Intel System Block Diagram



Processor

The Compaq Evo D510 e-pc is equipped with either a socket 478B Intel Celeron or Pentium 4 processor. The processor is connected to the system board through a Pin Grid Array (PGA) 478B Socket.



A heatsink and fan (not shown) cover the processor to prevent it from overheating. If the heatsink is removed, the thermal interface material between the heatsink and the processor must be replaced. If no thermal interface is used or the old one is re-used, then cooling may be impaired and the processor damaged.

Intel Pentium 4 (Socket 478)

The Intel Pentium 4 processor has the following features:

- Speeds ranging up to 2.6 GHz at the time of initial product release
- Data bus frequency of 400 MHz
- Dual Independent Bus architecture, which combines a dedicated 64-bit L2 cache bus (supporting 256 KB or 512 KB) plus a 64-bit system bus that enables multiple simultaneous transactions
- MMX2 technology, which gives higher performance for media, communications and 3D applications
- Dynamic execution to speed up software performance
- Internet Streaming SIMD Extensions 2 (SSE2) for enhanced floating point and 3D application performance
- Uses multiple low-power states, such as AutoHALT, Stop-Grant, Sleep and Deep Sleep to conserve power during idle times (refer to page 47 for PC power states)

The Pentium 4 processor is packaged in a pin grid array (PGA) that fits into a PGA478B socket. The Pentium 4 integrates the following cache memories on the same die as the processor cache:

- A trace instruction and L1 data cache. The trace cache is 4-way set associative.
- A 256 KB or 512 KB L2 cache. The L2 cache is 8-way associative.

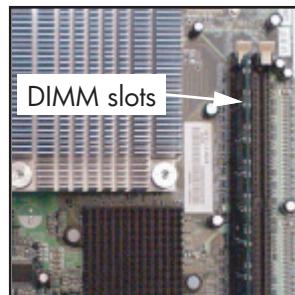
Intel Celeron (Socket 478)

The “new” Celeron (socket 478) processor is based on the Pentium 4 architecture. It is supported by the Intel 845G chipset. The “new” Celeron processor also features the following:

- Processor speeds ranging from 1.7 to 1.8 GHz at the time of initial product release
- Front side bus 400 MHz
- 128 KB or 256 KB cache

Main Memory

There are two memory module slots on the system board for installing main memory. You can install 266 MHz DDR-SDRAM modules; these are available in 128, 256, 512 MB and 1 GB memory modules. You can install a maximum of 2 GB of memory (2 x 1 GB modules).



You can only use non-ECC memory modules.

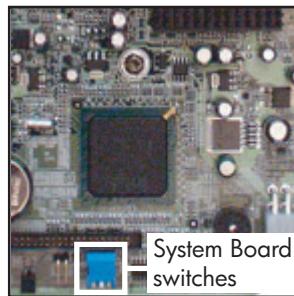
DDR-SDRAM

Short for Double Data Rate-Synchronous DRAM, DDR-SDRAM is a type of SDRAM that supports data transfers on both edges of each clock cycle, effectively doubling the memory chip's data throughput. DDR-SDRAM also consumes less power. DDR-SDRAM is also called SDRAM II.

While the new memory module is clocked at the same speed as normal SDRAM, it is able to transport double the amount of data by using the rising as well as falling edge of the clock signal for data transfers. DDR-SDRAM has another important enhancement over SDRAM. Its voltage supply uses only 2.5 V, instead of 3.3 V. This and the lower capacities inside the memory chips lead to significantly reduced power consumption.

DDR-SDRAM DIMMs are not compatible with SDRAM DIMMs. The new DDR-DIMMs come with 184 instead of the 168 pins used by SDRAM-DIMMs. The module itself looks almost identical to SDRAM, but it has only one notch on its connector surface.

System Board Switches



The following table gives the functionality and default position of switches on the system board switch block.

Switch	Switch Position	Function
1	ON	Bootblock protected (default)
	OFF	Bootblock not protected
2	ON	Clear CMOS and reload default values in Computer Setup. Clear all passwords.
	OFF	CMOS locked (default)
3	ON	Reserved
	OFF	Reserved (default)

Hard Drives

A 3.5-inch hard drive is supplied on an internal shelf. These hard drives can be provided with the PC:

	20 GB Ultra ATA 100	40 GB Ultra ATA 100	20 GB Ultra ATA 100	40 GB Ultra ATA 100	80 GB Ultra ATA 100
Average Seek Time (ms)	8.9 to 12.1		8.5 to 8.9		9.5
Track-to-Track Seek Time (ms)	1.5		1.2		0.95
Full Stroke Seek Time (ms)	20 to 25		15		—
Rotational Speed (RPM)	5400		7200		7200
Buffer Size (MB)	2		2		2

Ultra-ATA/100 Hard Drives

ATA (AT Attachment) is a disk drive implementation designed to integrate the controller into the drive itself, thereby reducing interface costs. ATA is also known as IDE (Integrated Drive Electronics).

Ultra ATA/100 is the latest generation of the ATA interface, it increases burst data rates significantly over previous versions of the protocol. Also known as Ultra DMA/100 and Feature ATA, Ultra ATA/100 allows host computers to send and receive data at 100 MB/s. The result is maximum disk performance under PCI local bus environments.

At its fast burst data rates, Ultra ATA/100 removes bottlenecks associated with data transfers, especially during sequential operations. Ultra ATA/100 also delivers heightened data integrity to the EIDE interface through use of a 40-pin 80-conductor cable, and CRC (Cyclic Redundancy Check) error detection code. The 80-conductor cable reduces crosstalk and improves signal integrity by providing 40 additional ground lines between the 40-pin IDE signal and ground lines. The connector is plug-compatible with existing 40-pin headers, and the incremental cost for the cable should be minimal.

By increasing the burst transfer rates of IDE drives, Ultra ATA/100 brings the effective transfer rate of the system's bus and a drive's internal data rate that much closer into balance. Ultra ATA/100 allows greater system throughput, particularly for long sequential transfers required by audio/visual applications.

Ultra ATA/100 hard drives are backwards compatible with earlier devices but will take on the speed of earlier devices when used in their stead.



S.M.A.R.T. or Self Monitoring Analysis and Reporting Technology allows the hard drive to report certain types of degradation or impending failure. This allows the operating system to take the necessary precautions and warn the user. The system is comprised of software that resides both on the disk drive and on the host computer. The disk drive software monitors the internal performance of the motors, media, heads, and electronics of the drive, while the host software monitors the overall reliability status of the drive. The reliability status is determined through the analysis of the drive's internal performance level and the comparison of internal performance levels to predetermined threshold limits.

Optical Drives

Some Compaq Evo D510 e-pc models are fitted with a 24X max slim IDE CD-ROM drive, an 8X/8X/24X slim IDE CD-RW drive or an 8X/24X slim IDE DVD-ROM drive.

Features of the Slim CD-ROM Drive

- CD-DA
- CD-ROM Mode 1, Mode 2
- CD-I (Mode 2, Form 1 and 2)
- Photo-CD (single and multi session)
- Enhanced CD

Description	
Read Speed	24X max
Host Interface	IDE (ATAPI)
Disc Diameter	120 mm
Storage Capacity	656 Mb
Data Transfer Rate	Burst: 33.3 MBs (max) Sustained: 1545~3600 KBs
Average Access Time	115 msec (average)
Buffer Memory Size	128 Kb
Rotational speed	5136 rpm

Features of the Slim CD-RW Drive

- Supported CD-ROM formats (read and write):
 - ❑ CD-ROM
 - ❑ CD-Text
 - ❑ Video CD
 - ❑ CD-Extra
 - ❑ CD-DA
 - ❑ CD-ROM XA
 - ❑ CD-R (Orange Book Part 2)
 - ❑ CD-RW (Orange Book Part 3)
- Supported CD-ROM formats (read only):
 - ❑ Photo CD (single and multi session)
- Interface type: E-IDE/ATAPI

Description	
Write/Read Speed	Write CD-R 8X max Write CD-R/W 8X max Read 24X max
Sustained Data Transfer Rate (maximum)	3,600 KB/s CAV
Storage Capacity	700 MB or up to 74 minutes of audio per disc
Random Access Time (Average)	140 ms
Buffer Memory Size	2 MB
Loading Type	Manual
Mounting Type	Horizontal and vertical
Weight	200 g approximate
Acoustic Noise	< 45 dBA at 1 m
Reliability	MTBF 6,000 POH

Features of the Slim DVD-ROM Drive

- Supported formats (read only):
 - ❑ DVD-ROM
 - ❑ CD-ROM Mode 1 and 2 data disc
 - ❑ Photo-CD Multi session
 - ❑ CD Audio disc
 - ❑ Mixed mode CD-ROM disc (data and audio)
 - ❑ CD-ROM XA
 - ❑ CD-I
 - ❑ CD-Extra
 - ❑ CD-Text
 - ❑ CD-R
 - ❑ CD-RW
- Interface: E-IDE/ATAPI, Ultra DMA mode 2 (33.3 MB/s)

Description	
Data Capacity:	
Capacity DVD-ROM	Up to 8.5 GB/side
Capacity DVD-RAM	4.7 GB/side
Capacity DVD-R	4.7 GB/side
Capacity CD	700 MB
Data Transfer Rate	8X max DVD 24X max CD-ROM
Access Time (Average)	90 ms for single-layer DVD-ROM 130 ms for dual-layer DVD-ROM 85 ms for CD-ROM
Loading Type	Manual, with electrical release of tray
Mounting Type	Horizontal and vertical
Weight	180 g typical
Buffer Memory Size	512 KB
Acoustic Noise	< 46 dBA at 0.5 m
Reliability	MTBF 80,000 POH



If a disk is still in the drive after power failure or drive failure, the disk can be removed by inserting a straightened paper-clip into the small hole at the bottom of the door.

Digital Versatile Disk (DVD) Technology

Digital Versatile Disc (DVD) is a medium for the distribution of from 4.7 to 17 GB of digital data on a 120 mm (4.75 inch) disc. This huge volume of data (CD-ROMs can store 680 MB) can be used to store up to nine hours of studio quality video and multi-channel surround-sound audio, highly interactive multimedia computer programs, 30 hours of CD-quality audio, or anything else that can be represented as digital data.

A DVD looks like a CD-ROM: it is a silvery disc, 4.75 inches in diameter, with a hole in the center. Like a CD, data is recorded on the disc in a spiral trail of tiny pits, and the discs are read using a laser beam. The DVD's larger capacity is achieved by making the pits smaller and the spiral tighter, and by recording the data in as many as four layers, two on each side of the disc.

To read these tightly packed discs, lasers that produce a shorter wavelength beam of light are required, as are more accurate aiming and focusing mechanisms. In fact, the focusing mechanism is the technology that allows data to be recorded on two layers. To read the second layer, the reader simply focuses the laser a little deeper into the disc, where the second layer of data is recorded.

Not only are two layer discs possible, but so are double-sided discs. The availability of four layers is what gives DVD its 17 GB capacity.

	DVD	CD
Diameter	120 mm	120 mm
Thickness	0.6 mm	1.2 mm
Track Pitch	0.74 nm	1.6 nm
Minimum Pit Length	0.40 nm	0.834 nm
Laser Wavelength	640 nm	780 nm
Data Capacity (per layer)	4.7 GB	0.68 GB
Layers	1, 2, 4	1

Audio features of DVD-Video

A DVD-Video disc can have up to 8 audio tracks (streams). Each track can be in one of three formats:

- Dolby Digital (Dolby AC-3): 1 to 5.1 channels
- MPEG-2 audio: 1 to 5.1 or 7.1 channels
- LPCM: 1 to 8 channels

Dolby Digital is multi-channel digital audio, using lossy AC-3 coding technology from original PCM with a sample rate of 48 kHz at up to 24 bits. The bitrate is 64 kbps to 448 kbps, with 384 being the normal rate for 5.1 channels and 192 being the normal rate for stereo (with or without surround encoding).

MPEG audio is multi-channel digital audio, using lossy compression from original PCM format with sample rate of 48 kHz at 16 bits. Both MPEG-1 and MPEG-2 formats are supported. The variable bitrate is 32 kbps to 912 kbps, with 384 being the normal average rate. MPEG-1 is limited to 384 kbps.

Linear PCM is uncompressed (lossless) digital audio, the same format used on CDs and most studio masters. It can be sampled at 48 or 96 kHz with 16, 20, or 24 bits/sample. (Audio CD is limited to 44.1 kHz at 16 bits.) There can be from 1 to 8 channels. The maximum bitrate is 6.144 MBps.

DVD Region Codes

After setting the DVD region (by playing a DVD video for the first time), the DVD region can be changed four times; after that the DVD drive will only play DVD videos from the last DVD region that was set.

Regional Codes	Region
1	USA & Canada
2	Europe (excluding former USSR countries), Japan, Near East (including Iran and Egypt), South Africa
3	South East Asia, South Korea
4	Latin America & Oceania (Australia, New Zealand)
5	Africa (excluding Egypt and South Africa), Eastern European countries, Sub-Indian continent
6	China

CD-RW Technology

CD-RW drives use a technology known as optical phase-change. It does not use magnetic fields like the phase-change technology used with magneto-optical technology. The media are generally distinguishable from CD-R discs by their metallic grey color. The basic structure of the discs, however, is the same as a CD-R disc but with significant detail differences. A CD-RW disc's phase-change medium consists of a polycarbonate substrate, moulded with a spiral groove for servo guidance, absolute time information and other data, on to which a stack (usually five layers) is deposited. The recording layer is sandwiched between dielectric layers that draw excess heat from the phase-change layer during the writing process. In place of the dye-based recording layer on a CD-R disc, CD-RW commonly uses a crystalline compound made up of a mix of silver, indium, antimony and tellurium. This mix, when heated to a certain temperature and then cooled becomes crystalline, but if heated to a higher temperature it becomes amorphous when it cools down again. The crystalline areas allow the metallized layer to reflect the laser light better while the non-crystalline portion absorbs the laser beam, and is therefore not reflected.

CD-RW devices use three different laser powers to achieve these effects in the recording layer:

- the highest, called 'Write Power,' creates a non-crystalline (absorptive) state on the recording layer
- the medium, 'Erase Power,' melts the recording layer and converts it to a reflective crystalline state
- the lowest, 'Read Power,' does not alter the state of the recording layer, so it can be used for reading the data.

During writing, a focused 'Write Power' laser beam selectively heats areas of the phase-change material above the melting temperature (500-700° C), so all the atoms in this area can move rapidly in the liquid state. Then, if cooled sufficiently quickly, the random liquid state is 'frozen-in' and the so-called amorphous state is obtained. The amorphous version of the material shrinks, leaving a pit where the laser dot was written, resulting in a recognizable CD surface. When an 'Erase Power' laser beam heats the phase-change layer to below the melting temperature but above the crystallization temperature (200° C) for a sufficient time (at least longer than the minimum crystallization time), the atoms revert back to an ordered state (the crystalline state). Writing takes place in a single pass of the focused laser beam, sometimes referred to as 'direct overwriting' and the process can be repeated several thousand times per disc.

Once the data has been burned the amorphous areas reflect less light, enabling a 'Read Power' laser beam to detect the difference between the lands and the pits on the disc. One compromise here is that the disc reflects less light than CD-ROMs or CD-Rs and consequently CD-RW discs can only be read on CD players that support the new MultiRead specification.

CD-RW drives are dual-function, offering both CD-R and CD-RW recording, so the user can choose the best media for a particular job.

Although UDF (Universal Disc Format) allows users to drag and drop files to discs, CD-RW is still not as easy to use as a hard drive. Initially limitations in the UDF standard and associated driver software meant that when data was deleted from a CD-RW, those areas of the disc were merely marked for deletion and were not immediately accessible. A disc could be used until all its capacity was used, but then the entire disc had to be erased to reclaim its storage space using a 'sequential erase' function. In hardware terms erasing a disk is accomplished by heating up the surface to a lower temperature, but for a longer time, which returns it to the crystalline state.

Evolution of the UDF standard and developments in associated driver software have improved things considerably, making CD-RW more like hard drives or diskette disks.

Graphics

The Compaq Evo D510 e-pc has an integrated Intel graphics solution.

Intel 845G Chipset Integrated Graphics

The Intel 845G chipset offers integrated graphics with Dynamic Video Memory Technology (DVMT). Some memory (8 MB) is reserved at boot time from the main memory; further memory is allocated as needed.

Key Features

- Dynamic Video Memory Technology: Ensures most efficient system memory usage for optimal 2D/3D graphics and system performance
- Zone Rendering Technology: Significantly reduces the memory bandwidth by up to eleven times which results in much higher 3D performance
- Tiled Memory Addressing: Performs Address Remapping in hardware for all graphics surfaces which increases page coherency and improves memory efficiency
- Dynamic Multi-Context Switcher: Provides deeply pipelined operations in both 2D and 3D allowing overlapping operations with no need to flush between modes of operation
- Intelligent Memory Manager: Fourth generation UMA Memory Manager that provides faster accesses, adequate burst sizes and smart page closing policies

- 4x Blit Engine for 2D operations: 256 bit wide Blitter fills at a much greater rate than memory bandwidth which speeds up operations like drop down menus
- Deep Display Buffers: Buffer for screen refreshes which enables higher system performance by reducing the CPU latency as well as decreasing the total transactions handled by the CPU
- Non-blocking and multi-tier cache structures: Dedicated internal caches for textures, colors, Z, and vertices which significantly reduces memory bandwidth and improves core performance
- Single-Pass Quad Texture Support: Supports up to blending operations for up to four textures in a single pass which reduces memory bandwidth requirements and CPU loading
- Texture Decompression: Provide up to 8x compression and consequent reduction in bandwidth and footprint

Memory Usage with Dynamic Video Memory Technology

At boot time the system BIOS dedicates 8 MB of system memory for graphics display. When more memory is needed the Intel 845G graphics driver submits a request to the operating system, the operating system grants the request based upon available system memory. When the application is closed, the OS will reallocate system memory back for generic use. The quantity of additional memory which can be allocated for video by the operating system is limited, the limit depends on the quantity of memory installed on the system and on the driver version (the latest drivers can be downloaded from the web).

The quantity of system memory allocated by the BIOS and the maximum limit cannot be modified by the user.

Connectors

A 15-pin VGA DB connector is located on the rear panel of the computer.

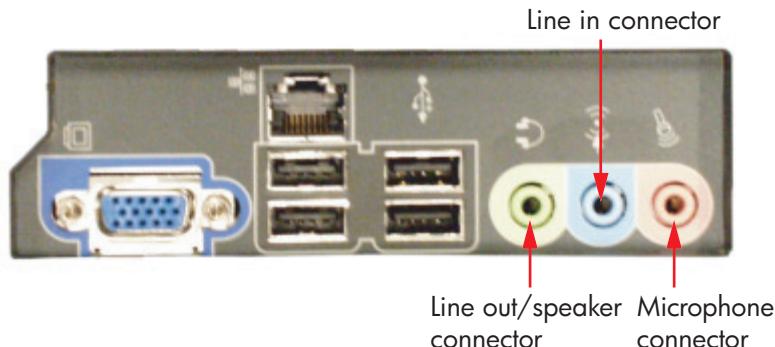
VGA Connector for Monitor



Audio

The audio solution on the Compaq Evo D510 e-pc is the Integrated Analog Devices AD1981A AC'97 SoundMAX CODEC. The AD1981A interfaces directly with the South Bridge chip and performs all digital operations, such as sample rate conversions and synthesis, as well as mixing and processing the analog signals.

All models have a Line In, Line Out and Microphone In connector located on the rear panel. These external jacks are standard connectors.



Analog Devices AD1981A

Features of the AD1981A include:

- S/PDIF output, 20 bits data format, supporting 48 kHz, 44.1 kHz, and 32 kHz
- Integrated stereo headphone amplifier
- Variable sample rate audio
- External audio power down control
- Greater than 90 dB dynamic range
- 16 bit stereo full duplex CODEC
- 20 bit resolution output DACs
- Three analog line level stereo inputs for: line in, AUX and CD
- Mono line level phone input
- Mono MIC input with built in programmable pre-amp
- High quality CD input with ground sense
- Mono output for speakerphone or internal speaker
- Power management support

Other Enhanced Features include:

- Built in digital equalizer function for optimized speaker sound
- Full duplex variable sample rates from 7040 Hz to 48 kHz with 1 Hz resolution
- Multiple CODEC configuration options

LAN Controller

The Compaq Evo D510 e-PC has an Integrated Intel Pro/100 VE Network LAN Controller (10 Base-T/100 Base-TX LAN Interface).

The Intel LAN boot ROM setup can be launched by pressing CTRL-S while booting your PC.

Intel PRO 100 VE Network Adapter Features

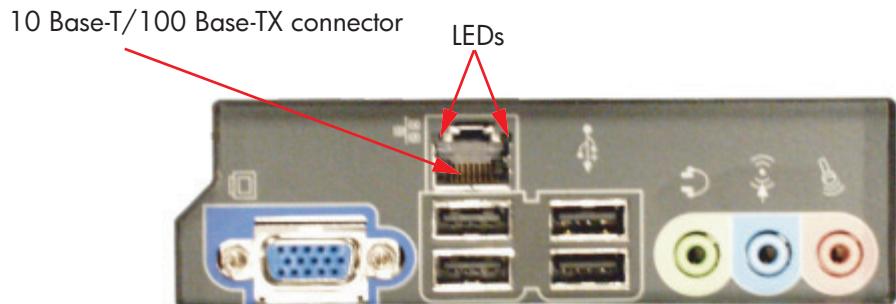
LAN Interface	<ul style="list-style-type: none">• 32 bits PCI 10 Base-T/100 Base-TX• RJ 45 LAN port
Power Management	<ul style="list-style-type: none">• RPO (Remote Power-On) for Windows 2000, Windows XP• RWU (Remote Wake-Up) for Windows 2000, Windows XP• On Now ACPI 1.0b• PCI Power Management 1.1, PCI 2.2
Manageability	<ul style="list-style-type: none">• DMI 2.0 Component Code• WfM 2.0, PXE 2.1, and RPL2.73 boot on LAN
Diagnostics	<ul style="list-style-type: none">• Production Diag• MAC address DOS report tool• User Diag for MS-DOS
Drivers	Windows XP, Windows 2000 support

Specifications

Network Interface	<ul style="list-style-type: none">• 10 Mbps Ethernet 10BASE-T: Ethernet IEEE 802.3 industry standard for a 10 Mbps baseband CSMA/CD local area network.• 100 Mbps Ethernet 100BASE-TX: Ethernet IEEE 802.3u industry standard for a 100 Mbps baseband CSMA/CD local area network.
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LAN Connector

The 10 Base-T/100 Base-TX LAN connector is located on the rear of the PC.



There are two LEDs on the 10 Base-T/100 Base-TX connector as indicated in the graphic above. The following table provides a status summary of these LEDs.

LED	Description	Status		
		Flashing	On	Off
Green	Speed LED	N/A	100 Base-TX connection between NIC and hub	10 Base-T connection between NIC and hub
Yellow	Link Integrity and Activity LED	Link integrity OK and network traffic present	Link integrity OK and no network traffic	No connection between NIC and hub

USB 2.0 Connectors

The Compaq Evo D510 e-pc features 6 USB 2.0 connectors (4 rear and 2 front).

USB 2.0 extends the speed of the connection from 12 Mbps on USB 1.1 to 480 Mbps on USB 2.0, providing an attachment point for next-generation peripherals for use with higher performance PCs and user applications. USB 2.0 is both forwards and backwards compatible with USB 1.1 and uses the same cables and connectors as USB 1.1.

Externally, a USB 2.0 system looks no different from a USB 1.1 system except for the identifying logos:



USB 1.1 Logo



USB 2.0 Logo

USB 1.1's data rate of 12 Mbps is sufficient for many PC peripherals. These peripherals will continue to operate with no change in USB 2.0 systems. The higher bandwidth of USB 2.0 permits the use of PC peripherals with wider functionality. The higher bandwidth supports the most demanding PC user applications, where multiple high-speed peripherals are running simultaneously. When using a USB hub it is important to make sure that you use a USB 2.0 compliant hub.

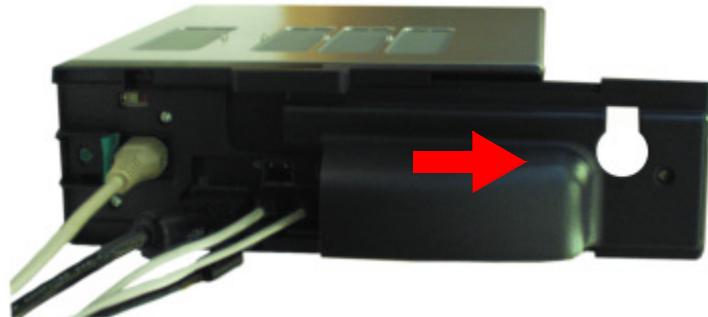
USB-to-serial and USB-to-printer adapters are available as optional accessories with the Evo D510 e-pc. USB-to-serial adapters allow you to connect serial devices through your USB port, similarly USB-to-printer adapters allow you to connect parallel devices through your USB port. USB-to-serial adapters require a special driver which can be downloaded from the support web site at: <http://www.compaq.com/support>.

Serviceability

This chapter introduces the enhanced serviceability features of the Compaq Evo D510 e-pc.

Removing the Chassis

1. Switch off the monitor and computer.
2. Remove the port control system (used to route and secure cables) if it is installed.

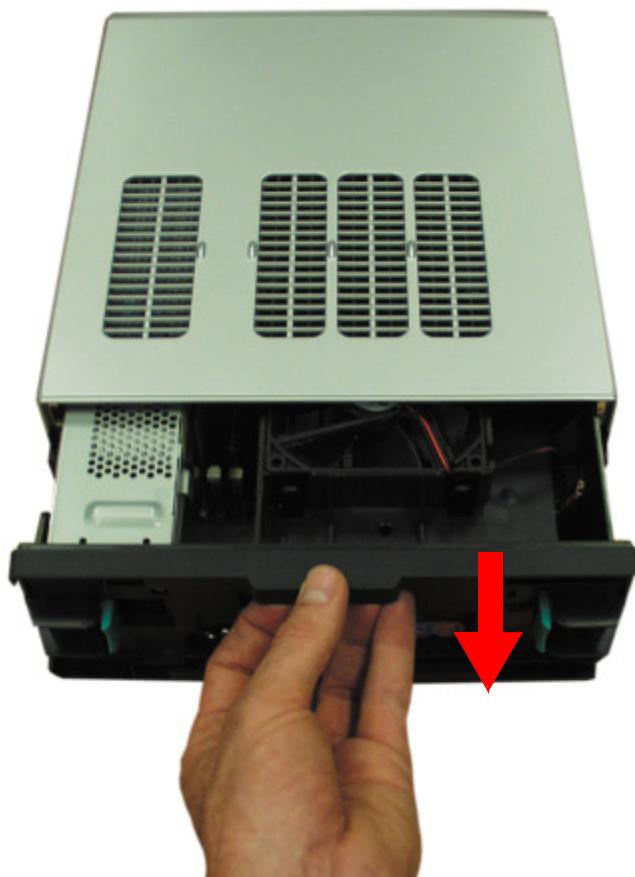


3. Disconnect all cables.

4. Push the two green latches inward.



5. Slide out the chassis from the enclosure.



Removing the Hard Drive

The hard drive has been designed to be easily removed. In the event of hard drive failure, Compaq Support may decide to send you a new hard drive so that you can replace the hard drive yourself.



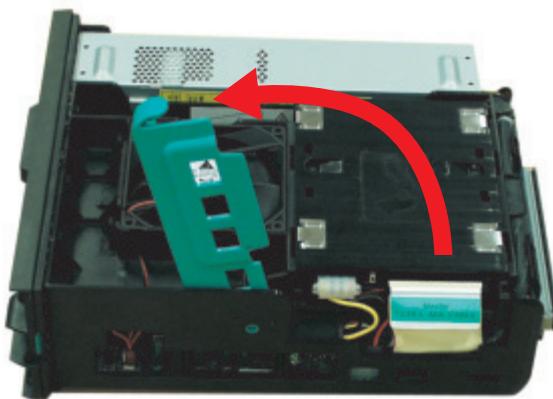
CAUTION: Always place the drive on a soft surface. Protect the hard drive from static electricity by leaving it in its anti-static bag until you are ready to reinstall it.

Before handling the drive, touch any unpainted metal surface to discharge static electricity. When you remove the hard disk drive from its antistatic bag, handle it only by the frame. DO NOT TOUCH the electrical components. Place the drive on the anti-static bag whenever you set it down.

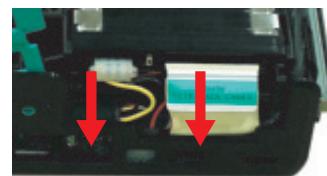
Hard drives are delicate and sensitive to shock vibration. When removing or installing a hard drive, be careful not to drop or knock the drive. Any shock may damage the drive and prevent it from functioning correctly.

1. Remove the chassis as described under “[Removing the Chassis](#)” section.
2. Unclip and swing the drive retaining clip upwards and to the side.
3. Disconnect the cables from the back of the hard drive.
4. Remove the hard drive.

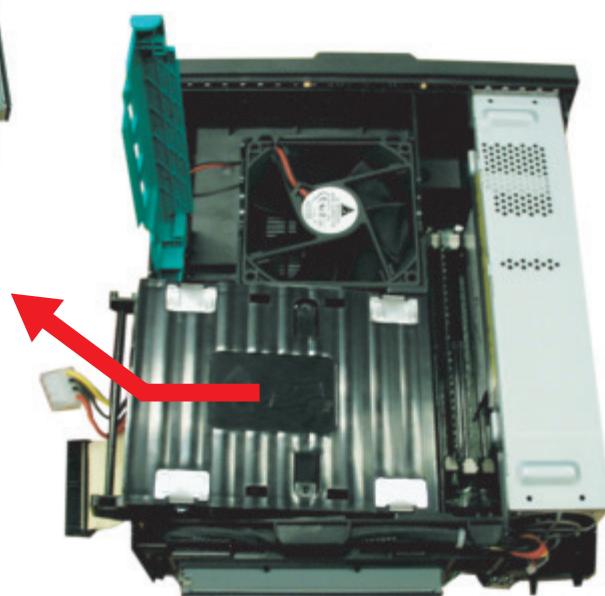
Step 2



Step 3



Step 4



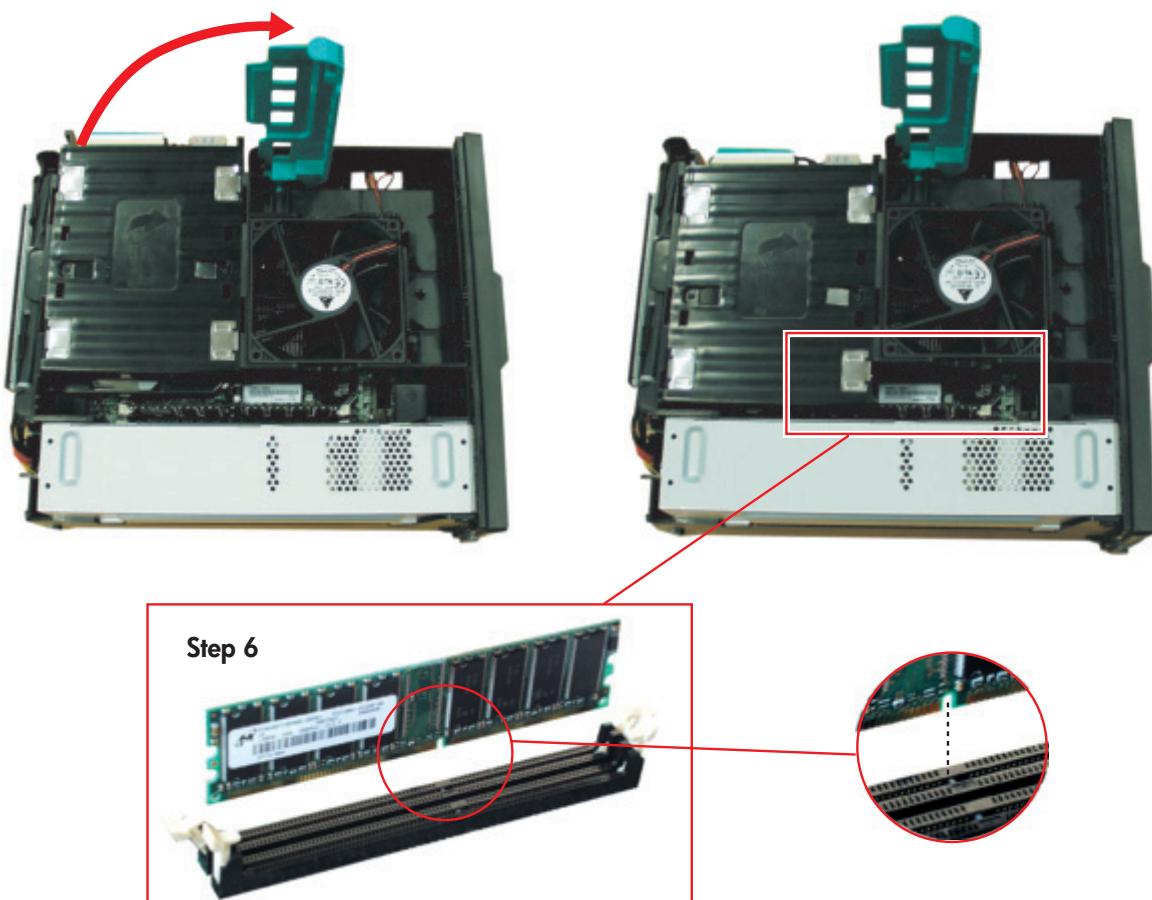
5. Remove the hard drive from it's carrier by unscrewing the four screws, two on each side, as shown.



6. To replace the hard drive, reverse the procedure described above taking care to reconnect all cables correctly and securely.
7. Replace the chassis in the enclosure.

Installing or Replacing Main Memory

1. Remove the chassis as described under “[Removing the Chassis](#)” section.
2. Unclip and swing the drive retaining clip upwards and to the side.
3. Slide the hard drive outwards to access the memory module sockets.
4. Either remove the module you want to replace or locate the empty memory module socket.
5. Make sure that the socket’s clips are open.
6. Align the grooves on the bottom of the module with the corresponding marks on the socket and push it firmly into place. The clips close automatically.
7. Replace the chassis in the enclosure.

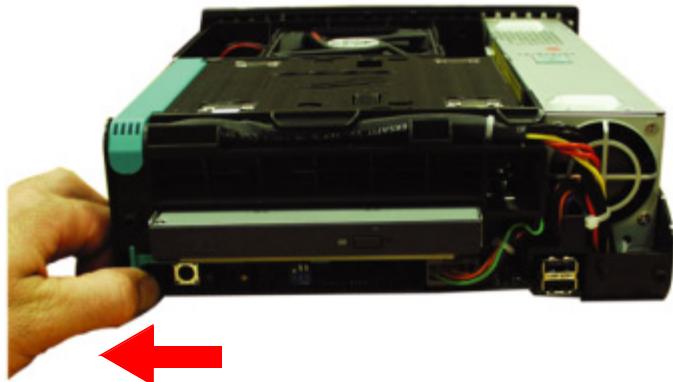


Replacing the Optical Drive



WARNING: To avoid electrical shock and harm to your eyes by laser, do not open the laser module. The laser module should be serviced by service personnel only. Do not attempt to make any adjustment to the laser unit. Refer to the label on the CD-ROM for power requirements and wavelength. This product is a class 1 laser product.

1. Remove the chassis as described in “[Removing the Chassis](#)” section.
2. Pull on the plastic latch below the optical drive to release it.



3. Slide the optical drive tray out of the front of the computer and detach the cable from the back of the drive.



4. Release the catch that secures the old drive in place then, remove the old drive from the tray.



5. Place the new drive in the tray and secure with the sliding catch.
6. Attach the cable to the back of new drive and slide the drive tray back into the computer until it clicks into place.
7. Replace the chassis in the enclosure.

BIOS Overview

This chapter describes the BIOS features of the Compaq Evo D510 e-pc.

BIOS Summary

The Compaq Evo D510 e-pc contains an AMI BIOS. The system ROM contains the POST (power-on self-test) routines and the BIOS: the System BIOS, video BIOS, and Intel LAN option ROM.

The system BIOS is identified by the version number JK.xx.yy (for example JK.01.01).

The latest BIOS version for your computer and instructions for updating the BIOS can be downloaded from the support Web site at:

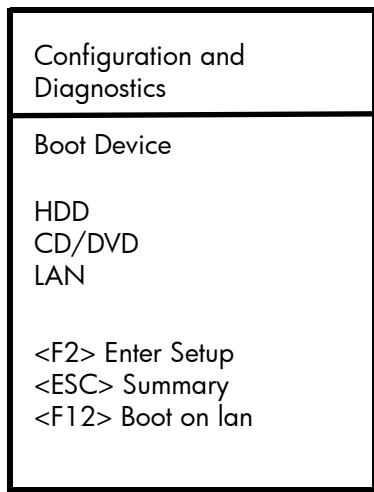
<http://www.compaq.com/support>

This section covers:

- The Configuration and Diagnostics Menu and Setup Program
- Setup and Advanced Menus
- Power Management and Wake up Events
- Beep Codes and Error Messages

Entering the Configuration and Diagnostics Menu

To enter the Configuration and Diagnostics menu on your Evo D510 e-PC, restart the computer and keep **F8** pressed. The Configuration and Diagnostics menu is displayed:



From the Boot Device section you can select which device to begin booting from.

Press **F2** to enter the Setup menu, see “Setup and Advanced Screens” for more information.

Press **Esc** to view the summary configuration screen. By default, this remains on the screen for 10 seconds, but by pressing the **Pause** key once, it can be held on the screen indefinitely until any key is pressed.

Press **F12** to boot (start) on the network. This option will only work if your PC and the network is configured correctly.

Setup and Advanced Screens

The Setup menu contains the following fields in one page.

Setup Menu

Field	Default Value
System Date	July 10 2002 Wed
System Time	00:00:00
1st Boot Device	USB Floppy
2nd Boot Device	CD/DVD
3rd Boot Device	HDD
4th Boot Device	LAN
Power-On Password	No password on boot
Set Supervisor Password	[Not set]
Set User Password	[Not set]
Remote Power On (RPO)	Enabled
Boot On LAN after RPO	Disabled
Front USB ports	Enabled
CD-ROM Interface	Enabled
HDD Interface	Enabled
Network Interface	Enabled
Audio Interface	Enabled

The boot order is defined by the settings of the 1st Boot Device to 4th Boot Device. Help is available for each item.

The Advanced menu contains the following fields in one menu.

Advanced Menu

Field	Default Value
Boot-time Diagnostic Screen	Disabled
POST Menu Wait Time	None
State after a power failure	Auto

Power Management and Wake Up Events

You can reduce the computer's overall power consumption by using Power Management to reduce power consumption when the computer is idle.

ACPI Power Management Modes (Windows 2000 and Windows XP)

The following table describes the power states and identifies the possible Wake Up Events for the different power management modes. Activity on any one of these events will cause the system to wake up from its current power state.

Power State	Description	Wake Up Event Windows 2000/XP
S1 (Idle)	Processor is shut down	RTC (Real Time Clock) LAN USB Power Button
S3 (Standby/Suspend to RAM)	All components of the system are shut down except for the system memory which remains active.	RTC (Real Time Clock) LAN USB Power Button
S4 (Hibernation/Suspend to Disk)	System memory is copied to the hard drive. All components of the system are shut down.	RTC (Real Time Clock) USB and LAN Power Button
S5 (Power Off)	All components of the system are shut down.	Power Button and LAN
S5 (After Power Loss)	All components of the system are shut down.	Power Button and LAN

- By default, when activating Standby mode in Windows XP or Windows 2000, the computer will go into the S3, "Suspend to RAM," power state.
- The Hibernate menu in Windows XP and Windows 2000 is the same as S4, "Suspend to Disk."



For the Standby command to activate the S3 power state and not S1, all drivers must be correctly installed.

Beep Codes and Error Messages

If the computer powers on but does not start properly, it attempts to report the error in two ways:

- It emits a modulated audio signal followed by one or more distinct beeps—this is preboot diagnostics.
- It displays an error message on the screen – this is a BIOS error.

Pre-Boot Audio Signal and Beeps

Preboot diagnostics is performed by a micro-controller on the system board, which generates audio signals when an error is encountered. The pre-boot audio signal can be used to identify the hardware component that needs troubleshooting or replacement:

The modulated audio signal can be interpreted by a support provider equipped with the Virtual Call Assistant. (For more information about the Virtual Call Assistant, refer to the *Virtual Call Assistant User's Guide*, available at <http://www.compaq.com/support>.)

Beeps	Issue/Meaning	Resolution
	 When the power switch is depressed, to activate the computer and there are no faults found, the computer will start up with no unusual or special sounds. If a fault is found during the start-up, the computer will generate a series of ringing tones followed by the correct number of beeps shown in this table that correspond to the fault found.	
1	Processor fault	<ol style="list-style-type: none"> 1. Check that processor and heatsink are properly installed. 2. Replace processor
2	Power supply overload	<ol style="list-style-type: none"> 1. Disconnect all external devices and restart the computer. If the computer starts correctly, add devices, one-at-a-time until the overload situation is achieved and the faulty device is identified. 2. If the computer does not start, disconnect the internal drives and start the computer. If the computer starts correctly, add devices, one-at-a-time until the overload situation is achieved and the faulty device is identified.
3	Memory error	<ol style="list-style-type: none"> 1. Verify that memory modules are properly installed in the computer. 2. Check that memory modules are the design specified by Compaq. 3. Try replacing memory modules with other known good modules.
4	Graphics solution error	Replace the system board.
5	Plug and Play initialization error	Replace the system board.
6	Corrupted ROM BIOS	Reflash the ROM BIOS.
7	Defective system board	Replace the system board.

Pre-boot diagnostics will only detect codes 3, 4, and 5 after a 15-second time-out.

If you miss the beep code, press and hold the power button for at least five seconds until the modulated sound is emitted again. This “playback” of the memorized code can also be used to diagnose an intermittent fault.



Avoid disconnecting the computer’s power cord as this will delete some of the computer’s error diagnostic information encoded in the modulated audio signal.

BIOS Error Messages

Error Message on Screen

If your computer encounters a BIOS error, it will display a BIOS error message on the screen.

Sometimes, recommendations for troubleshooting are also displayed below the error message, or you need to press **Enter** to get the recommendations.

The error message and recommendations (if provided) can be used to troubleshoot the problem.

Drivers and Software

This chapter describes the drivers and software preloaded with the Compaq Evo D510 e-pc.

Drivers

You can download up-to-date versions of drivers required for the Compaq Evo D510 e-pc from the “Software and Drivers” section of the support Web site at:

<http://www.compaq.com/support>

Software

Compaq Evo D510 e-pcs come preloaded with the following software.

Operating System

Choice of operating systems:

- Preloaded Windows XP Professional RTM, with possibility of downgrade to Windows 2000 SP2
- Preloaded Windows XP Home RTM
- Preloaded Windows 2000 SP2
- Linux offer available (no preload, only a CD in the box)

Application Software

- EZ CD Creator software from ROXIO included on CD-RW models
- Norton Antivirus is preloaded on the system
- Compaq Restore CD-ROM
- Compaq Operating System CD-ROM
- Microsoft Service Pack (optional)
- HP e-Diagtools CD-ROM
- Other CD-ROMs for Microsoft Office etc.

e-Diagtools

e-Diagtools, the hardware diagnostics utility, can help you diagnose hardware-related problems on your computer. For more information about this utility, refer to the *e-Diagtools User's Guide*. The *e-Diagtools User's Guide* is available on the e-Diagtools CD-ROM. (e-Diagtools is not available in all geographical areas.)

BIOS Updates

The system BIOS is identified by the version number JK.xx.yy (for example JK.01.01). The latest BIOS version for your PC and instructions for updating the BIOS can be downloaded from the Support Web site at:

<http://www.compaq.com/support>